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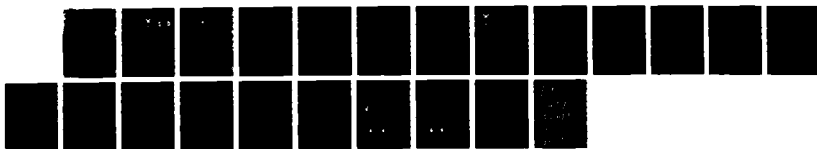
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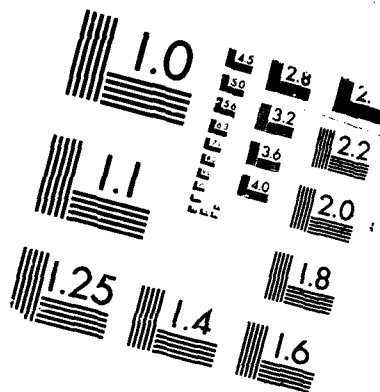
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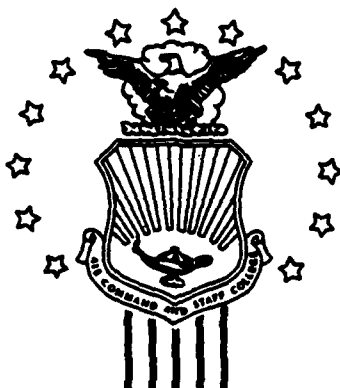


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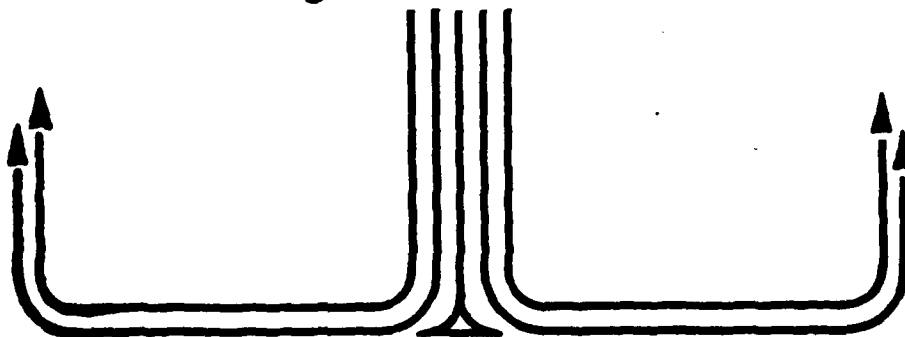
AIR COMMAND AND STAFF COLLEGE

STUDENT REPORT

PARALLEL TRACK TACTICS FOR
NIGHT ATTACK

MAJOR MICHAEL B. TUTIN #88-2635

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AUTHOR(S) MAJOR MICHAEL B. TUTIN, USAF

FACULTY ADVISOR LT COL JOHN E. PERRIGO, ACSC/3822 STUS-14

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<p>This article advocates parallel track tactics for night attack. The need for this technique is established, and a short historical development is given. Procedures for planning and flight operations are discussed, and the advantages over current night tactics are described. Constraints that will limit implementation are analyzed, and a methodology for incorporating night parallel track tactics into the USAF tactics "bag of tricks" is developed.</p>					
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PREFACE

Subject to clearance, this manuscript will be submitted to the USAF Fighter Weapons Review for publication consideration. The length of the article was recommended by the magazine. Elements of format, style, and tone meet the goal of this publication, which is to disseminate useful tactics and ideas to tactical aircrews. Acronyms are not spelled out in the text because they are well-known by the target audience.

Currently, night tactics for fighter attack aircraft do not effectively utilize the principles of mass, economy of force, timing and tempo, and surprise. This paper seeks to correct this deficiency by advocating parallel track tactics. This new technique can result in a greater concentration of tactical firepower at night. Possible constraints on the incorporation of parallel track tactics into the USAF tactics inventory are also treated.

Parallel track tactics for the F-111F were developed at RAF Lakenheath in 1985. A substantial portion of this article is based on the author's personal experience in the development and practice of this technique. Special thanks to Lt Col Robert Pastusek and Major Dale Waters, who contributed significantly to the effort at Lakenheath.



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ABOUT THE AUTHOR

Major Mike Tutin is a senior navigator with over 1400 hours in the F-111. He is currently a student at the Air Command and Staff College, and holds a B.A. degree in physics from Lehigh University and an M.S. degree in lasers and optics from the Air Force Institute of Technology. His assignments have included duties as an instructor weapons system officer at RAF Upper Heyford and RAF Lakenheath, and a tour as the Optical Countermeasures/Deception Program Manager at the Air Force Aerospace Medical Research Laboratory (AFAMRL). He holds two patents from his work at AFAMRL, and has published numerous classified technical reports, and the article "Electro-Optics in EW," which appeared in the February, 1982 edition of the Journal of Electronic Defense.

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EXECUTIVE SUMMARY



Part of our College mission is distribution of the students' problem solving products to DOD sponsors and other interested agencies to enhance insight into contemporary, defense related issues. While the College has accepted this product as meeting academic requirements for graduation, the views and opinions expressed or implied are solely those of the author and should not be construed as carrying official sanction.

— "insights into tomorrow" —

REPORT NUMBER 88-2635

AUTHOR(S) MAJOR MICHAEL B. TUTIN, USAF

TITLE PARALLEL TRACK TACTICS FOR NIGHT ATTACK

I. Purpose: To advocate parallel track tactics for night attack.

II. Problem: Current night tactics for fighter attack aircraft do not effectively utilize the principles of mass, economy of force, timing and tempo, and surprise. Future USAF weapon systems, like the F-16 LANTIRN and the F-15E, will yield enhanced night capabilities, but appropriate tactics must be developed to employ these systems.

III. Discussion of Analysis: Parallel track tactics were first developed by RAF Tornado aircrews. F-111F crew members at RAF Lakenheath picked up the technique in 1985, and have accomplished limited day practice since then. Parallel track tactics rely on a wingman flying a "wide" (greater than two nautical miles) line abreast formation without visual contact. This technique requires complex avionic systems that are fully operational, and high crew proficiency. By using mass, economy of force, timing and tempo, and surprise, parallel track tactics have the potential to reduce enemy weapon system effectiveness, facilitate the use of limited, friendly EW assets, increase the probability of kill against critical enemy targets, and enhance our survivability. Avionic system

CONTINUED

improvements, like the Global Positioning System and the ring laser gyro INS, will significantly improve our capability to fly parallel tracks at night. Safety and peacetime training requirements present challenges to the implementation of this technique. Task saturation in the night low level environment must be addressed. Current command guidance does not permit night parallel track training, and changes to this policy must define an acceptable risk level for peacetime operations.

IV. Conclusions: Parallel track tactics couple technological superiority with sound doctrine. This technique gives us one tool to exploit our advantage in night operations, and to exert maximum pressure on the enemy.

V. Recommendations: The tactical community must develop tactics that effectively use our current and planned night capabilities. The difficulty of the night low level mission demands a measured approach for the incorporation of parallel track tactics into our "bag of tricks." Night training must be preceded by expert evaluation, night single ship proficiency, and day parallel track training. Line aircrews can practice parallel track procedures during the day to determine the feasibility of this tactic.

GLOSSARY

1. AAA- Anti-aircraft Artillery
2. AAFCE- Allied Air Forces Central Europe
3. DMPI- Desired Mean Point of Impact
4. EW- Electronic Warfare
5. FLOT- Forward Line of Own Troops
6. GPS- Global Positioning System
7. IMC- Instrument Meteorological Conditions
8. INS- Inertial Navigation Set
9. IP- Initial Point
10. IR- Infra-red
11. P_k - Probability of Kill
12. TFR- Terrain Following Radar
13. TOT- Time on Target
14. VMC- Visual Meteorological Conditions

PARALLEL TRACK TACTICS FOR NIGHT ATTACK

INTRODUCTION

The scenario: it is the 15th of February, 1994, and you have been selected as the mission commander for a package attacking an enemy airfield in Central Europe. Fragged assets include eight F-15Es from your base, four F-16s with LANTIRN, and Wild Weasel and EF-111 support for FLOT crossing. The TOT block is 0220-0230Z. Most of us have participated in planning and flying composite force day operations, and MCM 3-1 contains classified guidance for sound tactical employment. However, as we add to our night capability with LANTIRN and the Strike Eagle, we must develop new tactics to fully exploit our 24 hour attack capability. The mission commander's night tactical plan must recognize the enemy's advanced technology and in-depth defense (2:2), and incorporate aspects of employment concepts that have worked before. The purpose of this article is to advocate one technique--parallel track tactics--that could enhance our night combat effectiveness. After tracing the development of parallel track tactics, this technique will be described and its advantages analyzed. Possible problems with safety and training will then be described, and a methodology for incorporating parallel track into our tactical "bag of tricks" will be advanced.

HISTORY

Previous night low level attack tactics, particularly for

the F-111, have stressed single ship operations with deconflicted TOTs. Route deconfliction was accomplished with timing or distance. F-111s have traditionally depended on terrain masking, internal countermeasures, and the enemy's inability to operate at night to get the job done. Some theaters of operation may be conducive to similar tactics, but flexibility is required when facing an in-depth threat array with night capability. Tactical employment plans must utilize limited EW assets, like the Wild Weasels and EF-111s, and this will require the concentration of forces. Obviously, concentrated firepower also enhances the probability of target destruction.

Recognizing the need for concentration of forces, even in the night low level environment, British Tornado crews devised parallel track tactics in the early 1980s. American F-111 crews were exposed to these techniques at the AAFCE Tactical Leadership Program and other joint arenas. RAF crews have incorporated parallel track planning into their computer flight planning programs, and practice the involved techniques regularly during the day. F-111 crews at Lakenheath have accomplished limited day practice since 1985.

PARALLEL TRACK--PLANNING AND OPERATIONS

With the serious exception of doing it in the dark, there is nothing "cosmic" about parallel track operations. Usual

route planning considerations for low level ingress, such as enemy defenses, terrain, system update points, etc., should be used to determine lead's flight path. As shown in Figure 1, the wingman's course is then plotted parallel to lead's with a predetermined separation. A two nautical split is a good starting point. For navigation, the wingman must have his own set of waypoints, and suitable update points for his own radar or other sensors. Update planning will be lessened with new systems like the Global Positioning System(GPS) and the ring laser gyro INS. The wingman's profile is basically a "wide" line abreast formation that must be maintained without visual contact. If possible, the basic route should be selected so that both airplanes can utilize terrain masking. For example, the airplanes could fly on opposite sides of a ridgeline. If high terrain perpendicular to course demands a different separation, the wingman should be conservative and plan to separate farther rather than collapse.

The parallel track can be maintained through the target area if DMPs are selected with sufficient lateral spacing to avoid each other's frag. Some collapse is possible, but a canopy filled with airplane on the bomb run could be very disconcerting! A different approach, which would also have to be used for closely-spaced DMPs, is to gain required spacing prior to the bomb run. As shown in Figure 2, the wingman could delay a turn prior to the IP, and "follow" lead

to the target. This split should be accomplished prior to the IP to decrease workload on the bomb run and to increase the probability of bombs on target.

Flying parallel tracks at night will require complex avionic systems and high crew proficiency. Navigation and timing must be precise, and all avionic systems must be fully operational. The crew must abort the profile with system degradation or position error. In addition to INS, radar, IR, and GPS systems for navigation, crews should use air-to-air TACAN to monitor formation spacing. The flight must obviously start together and timing must be made good along the entire route. Again, this is facilitated by modern avionics like the F-16 TOT clock. To summarize, the high workload environment of night parallel tracks will require dedicated planning, highly reliable avionic systems, and strict aircrew discipline.

ADVANTAGES

Parallel track tactics effectively use the principles of mass, economy of force, timing and tempo, and surprise. With most enemy weapon systems already degraded significantly by night operations, parallel tracks could help to "overwhelm enemy defenses and secure an objective at the right time and place (5:2-7)." While this technique may only double the force at a particular time and place, the synergistic effects of this use of mass could be sufficient to break the enemy's defenses through confusion and saturation. Parallel track

tactics also use the principle of timing and tempo, defined as the "execution of military operations at a point in time and at a rate which optimizes the use of friendly forces and which inhibits or denies the effectiveness of enemy forces (5:2-8)." Parallel track tactics will require less planning than two separate paths. Clearly, they will also facilitate the use of friendly EW assets for FLOT crossings and in the target area. The limited availability of Wild Weasels and EF-111s requires this concentration of attack assets to gain the full benefits of these weapon systems. It must also be realized that taking out enemy airfields and other critical targets, even with precision weapons, will require multiple attacks. Parallel track tactics should improve the P_K against these targets, and limit the number of repeat sorties against a target.

Surprise will also be attained with parallel tracks. In Southeast Asia, the dangers and limitations of bomber trail formations were well-documented. For example, enemy gunners could predict the positions of our fighters as they crossed "Thud Ridge," significantly degrading our survivability. After engaging one target, the AAA operators could also switch to the next aircraft in the "stream." With parallel tracks, only one aircraft would be in the real time envelope of enemy threat systems. With reduced predictability, the

enemy's engagement time lines will be compressed. The resultant confusion and saturation will enhance our survivability. Again, there may not be many effective bad guys at night, and parallel track tactics will increase his defensive problem and help to take away his night sanctuary.

Parallel track tactics are also well-suited for pre-planned tasking and day IFR conditions. If the possible execution time of a package is unknown, a parallel track plan can work in a day or night environment. If the package goes in good, day VMC, the wingman can easily move into TAC formation for mutual support. Conversely, if IMC is encountered during a day mission, the wingman can go to his parallel track. It would not be necessary to do a cosmic weather split, or to string out an entire package in a bomber trail formation. All of these above advantages will be partially offset by training and safety constraints.

CONSTRAINTS

Enthusiasm for parallel track tactics must be tempered by a proper concern for safety. A formation, night, low level, attack mission will require a demanding set of training prerequisites and operable systems. Current command guidance for F-111 night low level operations indicates the probable nature of limitations and system requirements (4:3-3 - 3-4). F-111 aircraft must have a terrain following radar (TFR), a radar altimeter, an INS, and an attack radar system all operational

to fly night low level. An immediate climb must be initiated whenever aircraft position cannot be confirmed. Flights are limited to a maximum of two aircraft, with a minimum in trail spacing of eight miles. Air-to-air TACAN lock-on is required for the flight. To be night TFR current, integrated F-111 crews must have flown an AUTO TFR mission together within the last 21 days (3:6-17). While these restrictions limit peacetime training, they do promote safety and are often the direct result of past experience with the weapon system.

Similar criteria must be developed for future night parallel track operations. Crews can be saturated with ground avoidance, navigation, and weapons tasks in the night low level environment. Since even triple redundant systems fail, and since normal flight visual cues are not available at night, training for this mission must focus on the constant monitoring and management of full-up systems. Crews will not be able to spend an inordinate amount of time worrying about their wingman's position. Formation spacing can be reduced with improved avionics like GPS and the ring laser gyro INS, but the parallel track profile should only be flown if the aircrew has complete confidence in his position and systems. The inherent task saturation nature of night low level operations must drive our training programs, but future combat employment requires the acceptance of some risk during peacetime training.

In addition, other possible constraints include crew

proficiency and discipline. Only experienced crews should fly this demanding profile, and stringent currency requirements should be implemented. A phased training program should be developed. Single ship night proficiency and day parallel track training must precede night training. The execution of this tactic will require high levels of aircrew skill and discipline. Route abort and back-up plans must be developed and followed. A communications plan, threat reactions, and target area deconfliction must be stressed. Finally, while parallel track tactics will rely heavily on complex avionics, crew performance will still be the largest determinant of mission success.

CONCLUSION AND RECOMMENDATIONS

The tactical community must develop tactics that effectively use our current and planned night capabilities. Only when we couple technological superiority with sound doctrine that includes such timeless principles as mass, economy of force, timing and tempo, and surprise, can we predict tactical success. Parallel track tactics meet these requirements.

With the exception of the F-111 and the A-7, our night capability at low altitudes has been limited. Experience with these aircraft has shown the dangers of night operations. Therefore, a measured approach to incorporate parallel track tactics into the tactical inventory must be followed. Crew

saturation and workload issues must be addressed, and experts should test the whole concept with different weapon systems. Clearly, day proficiency must precede night operations, experienced crews must be used, and reliable avionic systems must be maintained. The possibility for day IMC employment should also be studied. Line aircrews can practice parallel track procedures during day VMC and help to determine the feasibility of this tactic.

As demonstrated in the F-111 raid on Libya in 1986, multi-ship, night low level attacks are effective uses of tactical airpower. Parallel track tactics give us one tool to exploit our advantage in night operations, and to exert maximum pressure on the enemy.

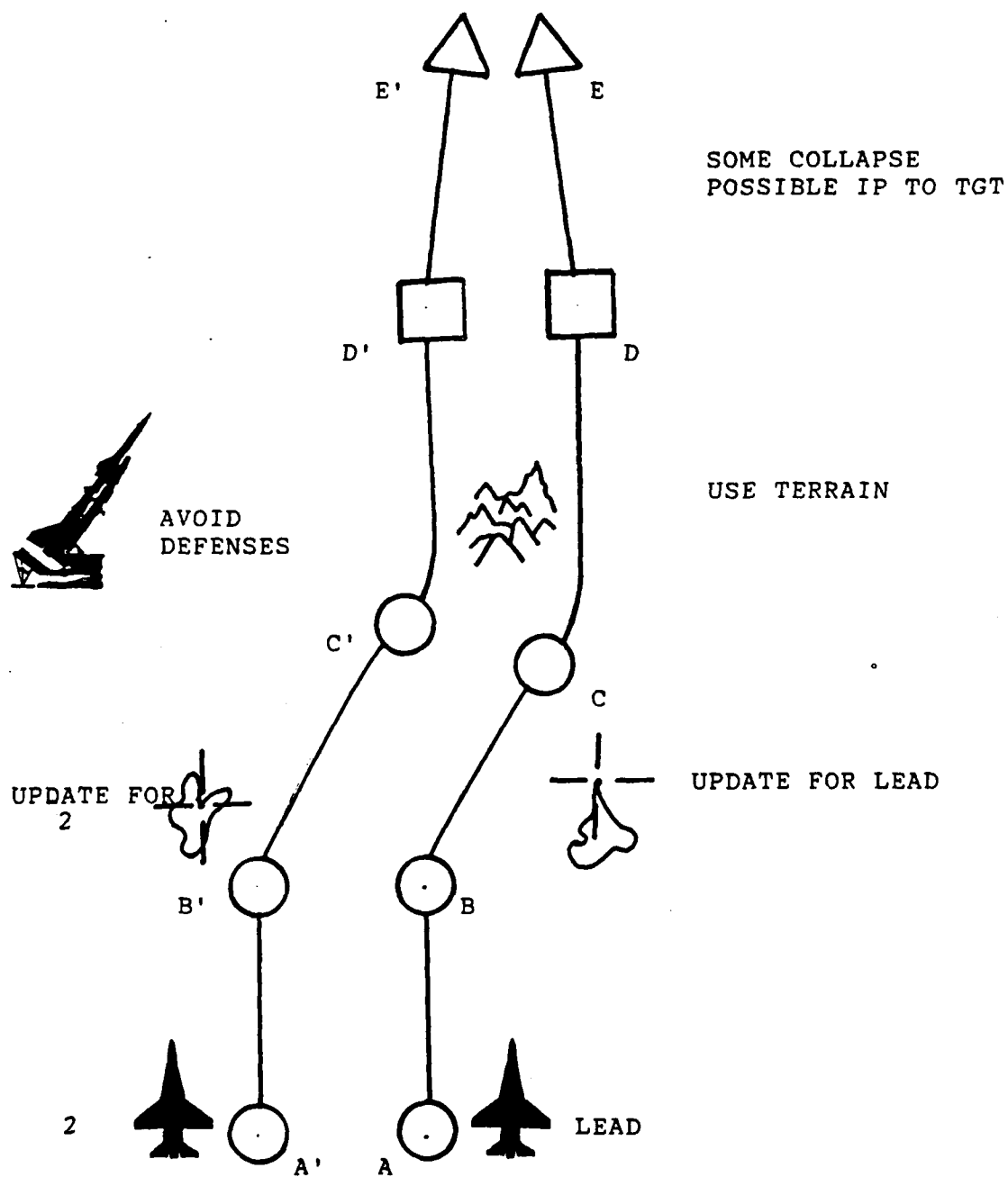


FIGURE 1: Parallel tracks for night attack. Lead and wingman fly parallel routes with nominal separation of 2 NM. Separate waypoints and update points must be planned. Precise navigation and timing gets both aircraft to target area simultaneously. (Not to scale--lateral split distance is exaggerated for clarity.)

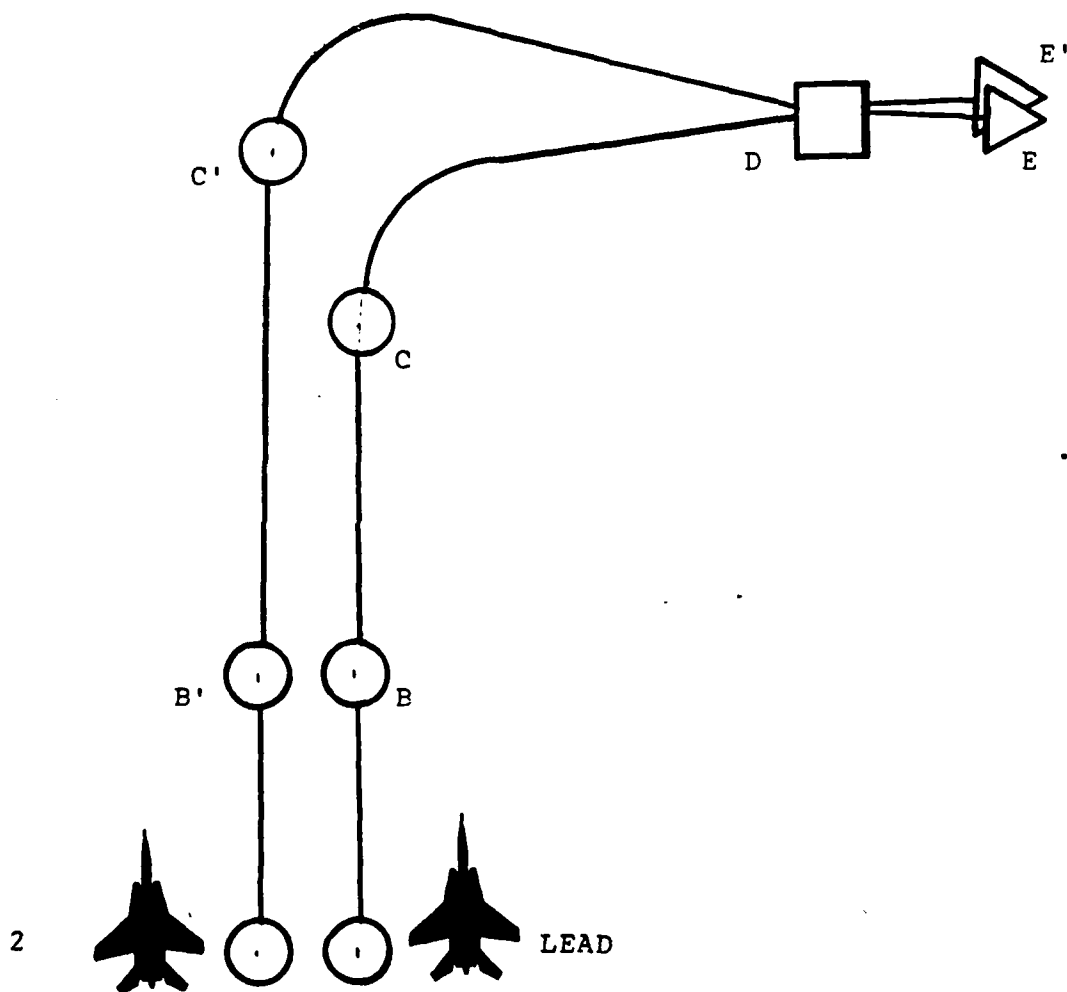


FIGURE 2: Target area maneuver for frag clearance with closely-spaced DMPs. Aircraft fly parallel track until Point C, where the wingman delays his turn until C'. He can then proceed behind lead to the IP and to the target with sufficient time differential for frag clearance.

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